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Comparative Analitical Study of Different Wireless Sensor Network Using Qualnet.

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Abstract:
Wireless Sensor Network (WSN) consists of spatially distributed autonomous sensor so cooperatively monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance and are now used in many industrial and civilian application areas, including industrial process monitoring applications, home automation, and traffic control, machine health monitoring, environment and habitat monitoring, healthcare. In this paper we analysis three routing protocols in WSN. As we have compared three basic routing protocols AODV, OLSR and ZRP in a varying mobility and constant nodes in WSN. The parameters used for performance of three are Throughput, End-to End delay and energy consumption in receiving and transmit time and Total Packet received.

Keywords: MANET, ZRP, AODV, WSN, OLSR

1. INTRODUCTION

The networks is IEEE802.15.4 WSN a sensor network normally constitutes a wireless Ad-hoc network meaning that each sensor supports a multihop algorithm where nodes functions are forwarders, relaying data packets to the base station .This way routers gain knowledge of the topology of the network. Though [6], [12] & [3] illustrates the performance of the protocols. This paper throws light on comparative results of AODV,ZRP & OLSR protocols of Mobile WSN networks using Qual Net Simulator [7] using CBR traffic. CBR is the data traffic that keeps bit rate same throughout the process.

2. SYSTEM DESCRIPTION

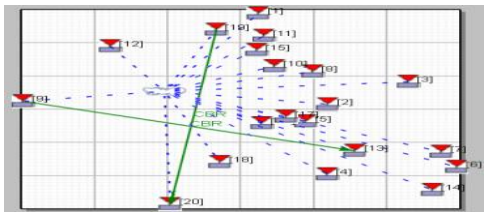


Figure 1 (a) Animation view of WSN network (20 nodes)

2.1 WSN

Wireless connection of varying mobility (5m/s,15m/s,10m/s,20m/s) with networks size of constant 20nodes for WSN is used for comparison the performance of routing protocols (AODV, ZRP and

OLSR) and over it data traffic of constant bit rate (CBR) is applied between source and destination. The nodes are placed randomly over the region of 1500m ×1500m.The 1, 2, 4, 5 and10 CBR applications are applied in their respective networks.

TABLE: 1 Parameters Used For the Simulation

Parameters	Value
Area of simulation	1500*1500 m²
Physical layer protocol	802.16, 802.11b
Mac protocol	802.16, 802.11b
Path loss model	Random waypoint mobility
Routing protocol	AODV,OLSR and ZRP
Traffic source	Constant Bit Rate
Simulation Time	600 seconds
Mobility of nodes	Min speed=1m/s Maxspeed=5m/s,10m/s,15m/s & 20m/s
Rate of packet generation	20 packets/s
Size of packets	1000 bytes

The network described above is analyzed by varying the routing protocols Adhoc on Demand Distance Vector (AODV) [8], Optimized Link State Routing (OLSR) [11]), zone routing protocol (ZRP) and then comparing the results of the respective protocols in terms of throughput, average end to end delay, average jitter, signals received with errors, average queue length, packets to application layer, total packets received at the receiver end for WSN Networks.

3. FIDELITY PARAMETERS

3.1 Throughput: Throughput is the average rate of successful message delivery over a communication channel; it is usually measured in bits per second (bit/sec), and sometimes in data packets per second. High throughput is always desirable in a communication system.

3.2 Average End to End Delay

End-to-end delay refers to the time taken for a packet to be transmitted across a network from source to destination**.** A data packet may take longer time to reach to the destination due to queuing and different routing paths.

3.3 Energy Consumption in Packet Transmit Mode

The lifetime, scalability, response time and effective sampling frequency all parameters of the wireless network depend upon the power. Power failure often because breakage in network. Energy

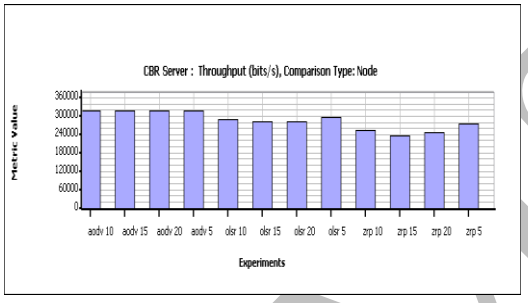
required maintaining the individual health of the node, during receiving the packets as well as transmitting the data both.

3.4 Total packet received

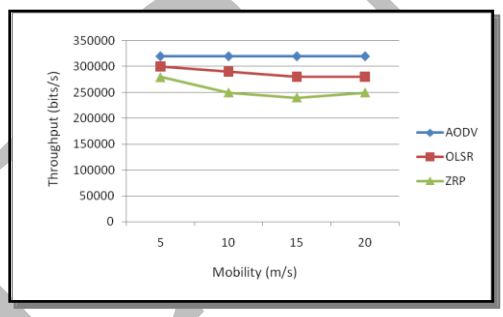
Total packet received by any server per second it determines the efficiency of the network for delivering the packet without loss. More is the packet received per unit time more efficient is the network.

4. RESULTS AND DISCUSSIONS

A. Throughput



(a) WSN

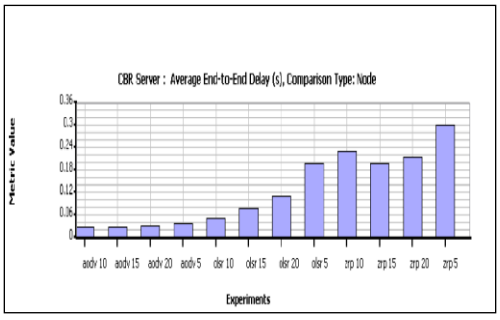


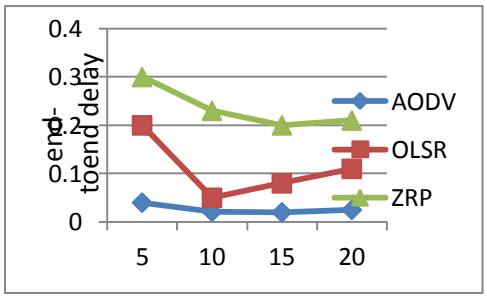
(b) WSN Network

Figure 2: Graph of Throughput of (a) WSN Network

From the Figure: 2, it is observed AODV with IEEE802.11 has highest throughput as compared with others protocols. Throughput with IEEE802.15.4 with ZRP and OLSR shows abrupt variations. Therefore AODV is most suitable.

B. Average End to End Delay End-to-end delay refers to the time taken for a packet to be transmitted across a network from source to destination**.** A data packet may take longer time to reach to the destination due to queuing and different routing paths.





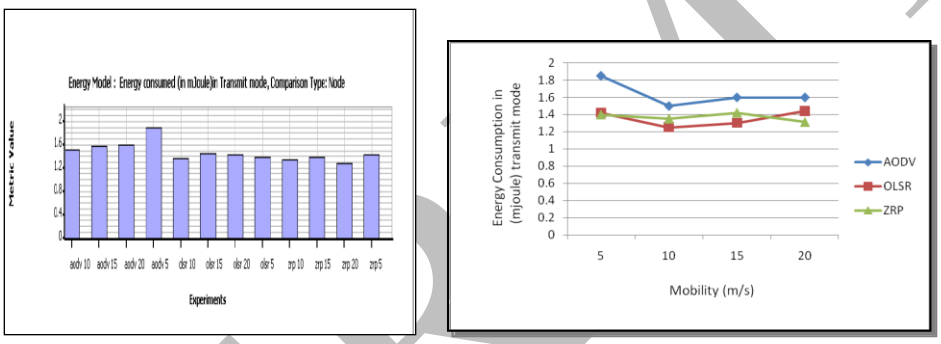
(a)Average End to End Delay for WSN network (b) WSN Network

Figure 3: Graph of *End to End Delay for* (a) WSN Network (b) WSN Network

Figure shows that due the hybrid characteristic of ZRP is the maximum even with the even mobility while is least for AODV and OLSR inferior between them. As IEEE802.11 AODV more delay. Where as in IEEE802.15.4 AODV shows least delay. Therefore according to network requirement we use suitable protocol. Such as MANET ZRP performs best. While for WSN AODV is best

C. Energy Consumption in Packet transmit mode

The lifetime, scalability, response time and effective sampling frequency all parameters of the wireless network depend upon the power. Power failure often because breakage in network. Energy required to maintain the individual health of the node, during receiving the packets as well as transmitting the data both.

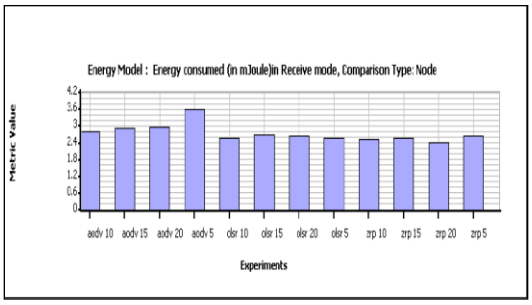


(a) WSN Networ (b)WSN Network

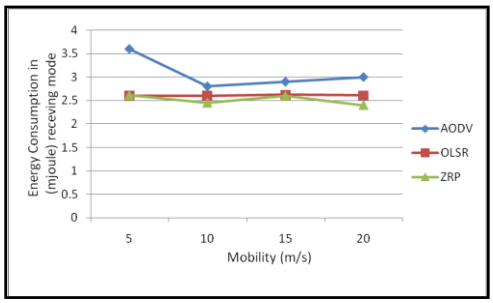
Figure 4: Energy consumption in packet transmit mode (a) MANET Network (b) WSN Network

These graphical results are highly significant. Graphs shows energy consumption is higher for all routing protocols in IEEE802.15.4 with change in mobility; ZRP is more suitable among all three in WSN. While for IEEE.802.11 AODV is a right option.[11]

D. Energy consumption in Packet receiving mode



(a) WSN Qualnet Network



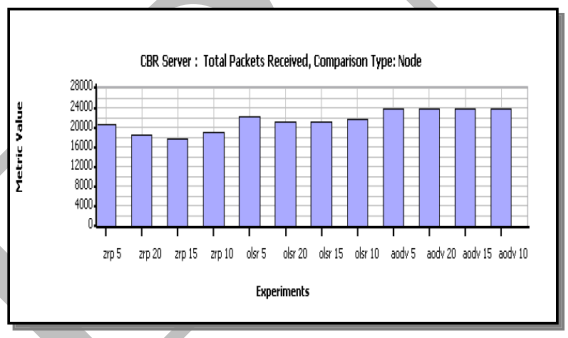
(b)WSN Network

Figure 5: Energy consumption in packet receiving mode (a) MANET Network (b) WSN Network

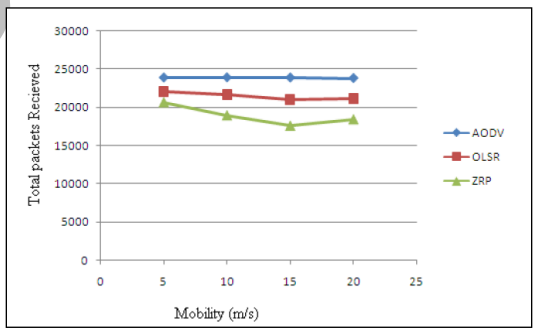
Figure shows that again for AODV the energy consumption is least and constant in MANET. Whereas in WSN again abrupt variations with change in mobility. ZRP is again the best right option in WSN.

E. Total packet received

Total packet received by any server per second it determines the efficiency of the network for delivering the packet without loss. More is the packet received per unit time more efficient is the network.



(a) WSN Qualnet Network



(b)WSN Network

5. CONCLUSIONS

This study was conducted to evaluate the performance Reactive (AODV), Hybrid protocols (ZRP) and Protocols (OLSR) in WSN. These routing Protocols were compared in terms of Throughput, End to end Delay, Energy consumed in transmit and receive mode and total packet received. Simulation results show that for the maximum throughput AODV is the best in IEEE802.15.4, whereas on the bases of end-to-end delay AODV shows maximum delay in IEEE802.15.4. Energy consumption for AODV is more with IEEE802.15.4.while ZRP and OLSR consume less transmitting and receiving energy in IEEE802.15.4. And lastly for Total Packet received AODV shows constant supply of packet data, whereas ZRP shows good response in starting but as the number of nodes increases it shows delay in packet received. So the overall conclusion states that AODV shows best response in Wireless Sensor Network.

REFERENCES

[1] G. Holland and N. Vaidya, "Analysis of T CP Performance over Mobile Ad-hoc network," 5th Annual International Conf. on Mobile Comp. And Net. Academic Publishers. Pp.275-288, 2002
[2] E. Baburaj and V. Vasudevan, "An Intelligent Multicast Ad-hoc on demand Distance Vector protocols for MANET," journal of Networks, Vol. 3, No. 6, June 2008.
[3] Ritika & Nipur, "Performance Evaluation of Reactive, Proactive and Hybrid Routing Protocols Based on Network Size for MANET," International Journal of Computer Science and Security (IJCSS), Volume (6): Issue (1), pp. 34-42, 2012
[4] M. Amin, M.Abrar & Zahid Ullah Khan, "Comparison of OLSR & DYMO Routing Protocols on the Basis of Different Performance Metrics in Mobile Ad-Hoc Networks," American Journal of Scientific Research, Issue 37, pp.34-57, 2011
[5] B. Ahmed, Md. Khaled Ben Islam and J. Rahman, "Simulation, Analysis and Performance Comparison among different Routing Protocols for Wireless Sensor Network," Computer Engineering and Intelligent Systems, pp.61-71, 2011
[6] S.C.Sharma and Parma Nand, "Performance study of broadcast based Mobile Ad-hoc Routing Protocols AODV, DSR, DYMO," International journal of security and its Applications Vol.5 No.1, January 2011.
[7] QualNet Simulator www.scalable-networks.com.
[8] C. Perkins, E. Royer, and S.Das, "Ad hoc on demand distance vector (AODV) routing," IETF RFC No. 3561, July 2003
[9] Haas, Zygmunt J., Pearlman, Marc R.,Samar, P., "Interzone Routing Protocol (IERP)," Internet-Draft Version 01, IETF ,June 2001
[10] Ian D. Chakeres and Charles E. Perkins, "Dynamic MANET on demand (DYMO) routing protocol," Internet-Draft Version 06, IETF, October 2006.
[11] A. Laouti, P. Muhlethaler, A. Najid and E. Plakoo, "Simulation results of the OLSR routing protocol for wireless network," INRIA Rocquencourt, Project Hypercom 2002.
[12] S. Ahmed , M.Bilal, U. Farooq, Fazal Hadi, " Performance Analysis of Various routing strategies in mobile Ad-hoc network using Qualnet simulator," IEEE conference 2007.